PRACTICAL ACTION
Technology challenging poverty

COCONUT PROCESSING

technical brief

Introduction

Coconuts are very versatile and can be used to produce oil to be used in food, cooking, in making soaps and cosmetics, and as a fuel for transport. Coir from the coconut shell can be used to manufacture items such as brushes, mats filtration pads and rope.

Figure 1: Dried coconut for oil extraction. Photo credit Practical Action /Zul

Small-scale processing

The coconut is cracked with a hammer or heavy knife and the shell removed.

Extracting the kernel can be done with hand held grating tools or mounted devices that are easier to use.

There are various kinds of grater available. The manual ones are either hand or foot operated. The number and size of grooves on the scraper affects the amount of oil that can be extracted. Grating the coconut manually is very tedious and quite hard work. If you are grating a large quantity of coconut, it may be worth investing in a small motorised grater. The amount of oil that can be extracted from the coconut is often higher when a motorised grater is used as the coconut is usually grated more finely.

The coconut kernel is dried to produce copra. Drying can be carried out by various means; direct heat smoking, direct heat smokeless drying and solar drying. The basics of food drying are explained in the Practical Action Technical Briefs; *Drying of foods*, *Solar drying* and *Tray dryers*.

Copra can be preserved through the process of sulphuring, explained in the *Drying of foods* Technical Brief

Oil Extraction

If dried coconut is used for oil extraction, it must ground or chipped into small pieces before it is pressed. coconut meat is then to increase the surface area. This makes it easier to extract all of the oil from the flesh. If larger pieces of coconut were used, some oil would remain trapped in the middle of the flesh
Coconut oil can be used as an edible oil or for industrial uses.

The oil content of coconuts is approximately 64% in the dried copra or 35% if the meat is used fresh.

Once the coconut has been grated, the oil can be extracted using one of a number of different oil presses. In many areas, oil is extracted using a 'ghanni'.

Figure 2: Grating coconut with a treadle powered machine in Bangladesh. Photo credit Practical Action / Neil Cooper

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This consists of a large mortar and pestle, the mortar being fixed in the ground and the pestle being moved within the mortar by animal traction. The oil runs out of a hole in the bottom of the mortar and the cake is scooped out by hand. This method is slow and requires two animals as they tire after 3-4 hours of work. In some areas, a motorized ghanni is used.

In addition to ghannis, oil can be extracted using oil presses or oil expellers. The coconut is placed in a metal cage that has perforations in the side. A metal plunger is then used to press the coconut causing the oil to pour out of the perforations. The plunger can be moved manually or with the aid of a motor. Oil expellers are only suitable for dried coconut. They use a horizontal 'screw' which feeds the grated coconut into a barrel-shaped outer casing with perforated walls. The coconut is crushed between the screw thread and the outer casing, causing the oil to pour out through the perforations. Most expellers are power-driven. With any power-driven equipment, it is important to consider how the equipment will be repaired as it becomes worn. If this cannot be done locally, it may be very expensive, in which case manual equipment may be preferable.

Mechanical extraction can be carried out using a centrifuge. Other methods of extracting oil include enzyme extraction and solvent extraction.

Clarifying

The crude oil will contain some of the pulp and fibre from the coconut. It also contains small quantities of water, resins, colours and bacteria, which make it darker in colour. These must be removed from the product.

The oil is heated to drive off the water and to destroy any bacteria. The other contaminants can be removed by either leaving the oil to stand for a few days until the contaminants come to the surface and can be skimmed off, or by using a clarifier. If the oil needs further clarifying it can be filtered through a funnel fitted with a fine cloth.

Packaging

The oil should be packaged in clean, dry, sealed glass or plastic containers to prevent the oil from becoming rancid and tasting 'off'. If glass is used it should be coloured as sunlight will also cause the oil to become rancid. If the oil is packaged properly and stored in a cool place away from sunlight, it should store for six to twelve months.

Manufacturer listing of equipment for coconut processing

Technology Consultancy Centre
University of Science and Technology
Kumasi
Ghana
Tel: +233 51 60297
Fax: +233 51 60137
Bridge Press
This machine is used for extracting oil from coconuts. Height of cage - 40cm; diameter of cage - 24.2cm. Capacity 200 coconuts in 8 hours. Power Manual.

TinyTech Plants
Tagore Road
Rajkot - 360 002
India
Tel: +91 281 2480166, 2468485, 2431086
Fax: +91 281 2467552
Email: tinytech@tinytechindia.com
Website: http://www.tinytechindia.com/
Copra Cutter
Cuts and breaks coconut balls into small pieces of 12mm or less. Capacity 150 kg/hour
Power Electric

technical brief

Coconut Development Board
Govt. of India
Kera Bhavan
Kochin - 682 011
India
Tel: 0484 369248/362237
Fax: 0484 371902
Email: cdbkochi@x400nicgw.nic.in

- Bridge Press

This machine is used for extracting oil from coconuts. Height of cage - 40cm; diameter of cage - 24.2cm. Capacity 200 coconuts in 8 hours. Power Manual

Azad Engineering Company
C-83
Bulandshahar Road
Industrial Area
Chaziabad - 201009 (U.P.)
India
Tel: +91 575 700708/730122
Fax: +91 575 702816

- Copra Cutter

Used for cutting coconuts.

Space Engineering Ltd.
Nelson Mandela Road
Dar Es Salaam
Tanzania

- Bridge Press

This machine is used for extracting oil from coconuts. Height of cage - 40cm; diameter of cage - 24.2cm. Nuts / Oilseeds. Capacity 200 coconuts in 8 hours. Power Manual

Development Authority
54 Nawala Road
Colombo 5
Sri Lanka
Tel: +94 1 502503/4
Fax: +94 1 508729

Arai Machinery Corporation
2-7-19, Okata
Atsugi-Shi
Kanagawa-Ken 243-0021
Japan
Tel: +81 46 2270461
Fax: +81 46 2270463

- MM2 Screw Press

This machine can be used to separate creamed desiccated coconut into virgin coconut oil and a fine aromatic desiccated coconut. It is also used for other fruits and vegetables. Power: Electric

- Fine Grinder

This machine can be used to separate creamed desiccated coconut into virgin coconut oil and a fine aromatic desiccated coconut, as well as other fruits and vegetables. Power: Electric

Societe de Production et d'Exploitation de Material de
Traitement du Karite
Contact M. Gadiaga Amadou
Secteur 2
BP 296
Koudougou
Burkina Faso
Tel: 44 03 58
Fax: 34 08 17

- Bridge Press

This machine is used for extracting oil from coconuts. Height of cage - 40cm; diameter of cage - 24.2cm. Food Groups Nuts / Oilseeds. Capacity 200 coconuts in 8 hours. Power: Manual.

Coconut oil equipment

Women's Revolutionary Socialist Movement
HQ
44 Public Road
Kitty
Georgetown,
Guyana

Gack Engineering
Tantra Hills, New Achimota,
Ant / B / 016 Accra,
P.O. Box 15883 Accra
Ghana
Tel: 221 21 404109/403744/403801

Larkai Engineering
Community 7, P.O. Box 8388
Tema
Ghana
Tel: 233 22 206809
Fax: 233 22 206809

TAMSA Trading
152 Sidwell Avenue,
P.O. Box 14305,
6061 Port Elisabeth
South Africa
Tel: 27 41 43 339
Fax: 27 41 411 731

Agrico Agricultural Engineers Limited Kaneshie
Industrial Area,
P.O.Box 12127
Accra-North
Ghana
Tel: 233 21 228 260/236 240/228 292
Fax: 233 21 230 481
E-mail: agrico@ncs.com.gh

Reference and further reading

- *Coconut Processing in the Mekong Delta* Food Chain Number 22, Jan 1998
- *A stirrup-operated Coconut Grater: Rural Technology Guide 6*
  Tropical Products Institute (New called NR International)
- *Coconut Crude – Vanuatu*, Hands On
  http://www.tve.org/ho.doc.cfm?aid=1431&lang=English
- A video on making copra and the manufacture if coconut oil has been produced by the Asian and Pacific Community Secretariat. The video is aimed at improving training and farm level technology use.
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  Jl. Rasuna Said
  Jakarta
  Indonesia